PATENT
871870-6

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: HEDMAN et al.

Serial No.: 10/014,727

Filed: December 10, 2001

Title: METHOD OF KILLING ORGANISMS AND REMOVAL OF TOXINS IN ENCLOSURES

Art Unit: 3643

Examiner: Kurt C. Rowan

DECLARATION OF MICHAEL GEYER UNDER 37 C.F.R. § 1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

1. I, the undersigned, am a registered Professional Engineer, a California-Licensed General Contractor, Board-Certified Industrial Hygienist and Board-Certified Safety Professional, and I am familiar with forced-convection structural heat treatment as described in United States Patent No. 6,327,812 and in the above-referenced patent application. The above-referenced patent application represents a method of heat treatment that includes a new process of filtering air during heating to remove fine, potentially harmful particulate matter.

2. This declaration is submitted to rebut the Examiner's rejection of Claims 18-23, 26-30, 36, and 40-43 under 35 U.S.C. § 103(a) as obvious, in the Office Action mailed September 21, 2004. In this declaration, I present objective evidence to show that it would not have been obvious to modify a simple thermal eradication process using forced convection, as disclosed by the Forbes patent, to add an equivalent level of filtration of heated air as described in the present application.

3. I have no financial stake in whether or not the present application issues as a patent. I have not and will not receive any compensation for preparing this declaration.

4. I have been engaged in the area of residential construction since 1977, professional engineering since 1985, and industrial hygiene and safety since 1990. I first became involved with thermal eradication methods using forced convection for treatment of structures, beginning around 1995. Since that time, I have participated in the heat treatment of numerous structures and maintain active contacts with those in the industry.

5. The present invention significantly differs from prior art heat-treatment and pest eradication methods, such as disclosed by U.S. Patent No. 4,817,329 ("Forbes"), by providing for heat-tolerant air filtration to remove fine, potentially harmful particulate matter. I am personally familiar with the practice and results achieved by both filtered and non-filtered heat treatment methods. I have previously heat-treat structures without filtration and without the knowledge of filtration benefits. I have found the use of filtration as taught by the present application to be surprisingly effective in controlling fine particulate concentrations during heat treatment, as further described below.

6. I have measured and analyzed airborne particulates during unfiltered heat treatment of structures as disclosed in the Forbes patent. Using sophisticated MIE Real-time aerosol monitors (mini-RAM) and collecting samples of both respirable and total particulate aerosols, I have analyzed these samples using simple gravimetric methods and microscopic methods including the use of scanning electron microscopy. Based on these results, I have detected particulate concentrations four to six orders of magnitude higher (i.e., greater by a multiple of 10^4 to 10^6) during forced-convective heating without filtration, than

before heating was initiated. Moreover, the type and concentration of biological materials aerosolized during heat treatment have been surprisingly large. These measurements were made in both residential and commercial structures that were vacant, had only minor visible mold colonies, if any at all, and moderate levels of cleanliness.

7. I have also measured particulate levels during heat treatment efforts when used in conjunction with heat-tolerant HEPA-filtered air scrubbers during the forced convective heating process. I have observed that the use of heat-tolerant filtration significantly controls aerosol particulate concentrations to within acceptable levels. In fact, I have often observed that the use of heat-tolerant filtration reduces the particulate concentration below background (pre-heat) conditions when used on a continuous basis. I have observed that the use of heat-tolerant filtration has greatly reduced the need to clean the work area post-heat, and controlled potentially harmful aerosols which workers and/or building occupants, would otherwise have otherwise been exposed to. I now consider the heat-treating of a structure without adequate filtration to control potentially harmful aerosols to be an egregious act, and, depending upon the circumstances, a negligent act that breeches the standards of care.

8. Thermal eradication methods without filtration are usually performed under positive pressure conditions by blowing air into the structure being treated. Some leakage of heated air from the structure is expected and even encouraged, as it is thought to promote air flow and heating of otherwise inaccessible areas, and prevent excessive pressure build-up. In some structures, this leakage can be fairly substantial, and it could be expected to remove some harmful airborne matter from controlled areas and into uncontrolled areas of a structure via convective transport. However, my measurements, as reported above, have shown that this leakage is not sufficient to prevent large increases in airborne

particulates within the treatment area, nor significantly remove airborne material present in the heated space. Moreover, I strongly believe that too much leakage will reduce effectiveness of the heat treatment effort by contributing to heat loss and lower heat-distribution uniformity

9. Surprisingly, combining heat-tolerant air filtration with active venting substantially reduces particulate levels without excessively increasing heating requirements (i.e., the heat load). This result is unexpected. One of ordinary skill would not have considered the possibility or benefits of air filtration, because air filtration was not practiced for any reason in typical pest eradication activities performed prior to 1995. Also, air was already being removed from the structure during heat treatment via leakage, and so filtration would merely increase this removal and would not have been expected to cause dramatically different results. Even if one of ordinary skill had considered the possibility of continuous filtration and venting, it would have been rejected as too expensive, too complicated and likely to cause excessive heat loss without a corresponding benefit.

10. I am not the only person that now recognizes the surprising benefits of aggressive air filtration during heat treatment. For example, Dr. Sean Abbott, Ph.D., an expert in the diagnosis and treatment of indoor air quality problems caused by mold and other fine substances, also recognizes the benefits of air filtration during thermal remediation. A statement by Dr. Abbot to this effect is attached as Exhibit A.

11. Based on information and belief, common thermal eradication methods for structural pests (e.g., termites) were known since about 1989, or about ten years prior to air filtration combined with heat treatment, as first introduced by Hedman. Despite this long period of use, the benefits of air filtration during thermal eradication were not recognized, even though suitable heat-tolerant air filters

were also known since before 1989. Moreover, it was not recognized that heat treatment caused a correspondingly large increase in fine particulate aerosols to be generated inside the treated structure. There was no recognized need for continuous air filtration during heat treatment. The long co-extensive period of use of thermal eradication and air filtering (e.g., during asbestos remediation efforts), without any adaptation of air filtering to thermal eradication, shows that the use of air filtering in conjunction with thermal eradication was not obvious.

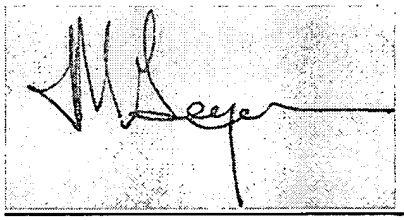
12. In my experience, those of ordinary skill employing thermal eradication for termites and other pests are generally not trained to recognize hazards regarding indoor air quality during non-chemical treatment, nor trained in the professional of aerosols and aerodynamics, nor with methods for controlling fine airborne particulates. To the contrary, thermal eradication is rightly understood as being free of the airborne (e.g., chemical) hazards associated with traditional pesticides. Therefore, those of ordinary skill would not have perceived the risk of increased airborne particulates from thermal eradication, nor with methods for controlling said particulate matter.

13. Also, the reasons why thermal eradication causes large increases in airborne particulates are complex, and are still not well understood. I have hypothesized that aggressive air movement keeps fine particles airborne that would otherwise settle out, and increased static electrical charges may induce particles to become airborne. In addition, heating may play a dual role by reducing available water molecules in the air thereby reducing the weight of porous particles, and also by drying out moist particles such as mold on surfaces of the structure; which then become airborne when they sporilate. Generally, the generation of fine airborne particles is probably due to a complex combination of factors rather than a single cause. One of ordinary skill in insect eradication is simply not trained to anticipate complex phenomena of this type, nor understand the physics of

particulate aerodynamics and fate and transport, and would not have anticipated the large increases in particulates that thermal eradication in fact creates. For the most part, these airborne particles are invisible to the naked eye and only specially train persons using sophisticated equipment (e.g., mini-RAMs) can detect and/or measure fine particulate aerosols.

14. Particles created during thermal eradication are generally microscopic in size and invisible, or nearly invisible, to the naked eye. Based on information and belief, those using thermal eradication to control termites and other pests were not aware of increases in airborne particulates prior to the present invention; there is no significant published literature in the pest eradication industry suggesting otherwise. Because the increased concentration of fine airborne particulates is generally invisible, with no odor, and easily inhaled by workers and/or building occupants, the potential harm and/or injury may not cause immediate effects in most people. Therefore, the increased concentration of fine airborne particulates would not have been obvious or detected to those of ordinary skill in the pest eradication business. Even now, some pest eradication businesses continue to perform thermal eradication without awareness of this issue and its potential hazard, and do so without air filtration to control elevated particulate concentrations and mitigate potential injury to persons exposed to the aerosol..

15. I hereby declare that all statements made herein are of my own knowledge, are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Michael Geyer, PE, CIH, CSP

February 19, 2005
Date

Sean P. Abbott, Ph.D.
2005

January 31, 2005

David Hedman
Precision Environmental
180 Canada Larga Road
Ventura, CA 93001

Re: **Position Statement: Use of Air Filtration during Thermal Remediation**

The notes on the following page are provided as per our conversation regarding the benefits and physical processes involved in removing aerosols with filtration. I feel strongly that air filtration should always be an essential component of the thermal remediation process.

Sincerely,

Sean P. Abbott, Ph.D.
(President, Natural Link MOLDLAB, Inc, Sparks, NV and Director, Natural Link Ltd., Edmonton, AB)

Use of Air Filtration during Thermal Remediation

Sean P. Abbott, Ph.D.
Natural Link Mold Lab, Inc.

Air filtration is an essential component of the thermal remediation process. Because large volumes of air are moved into the buildings during the thermal remediation process, the creation of aerosols are inevitable and need to be controlled and eliminated prior to completion of the project. Aerosols are small airborne particles and may include inorganic dusts, fibers and biological material. The bioaerosol component may include mold spores, animal hair, skin cells, pollen, insect parts, and bacterial cells. Other irritants in dust may include cellulose fibers and fiberglass.

Physical removal is a fundamental principle of remediation. Filtration of aerosols using high efficiency particulate air filters (HEPA filter) is an effective method of physical removal of particles during the thermal remediation process. HEPA filters are capable of removing sub-micron particles (0.3 μm). Significant air movement during the process, coupled with the thermal air convection associated with the addition of heated air, allows for large quantities of dust to be suspended in the air and captured in the air filters. Sufficient air exchange during the process is required to adequately filter the air within the building.

Regardless of the purpose for application of heat (insect control, mold or bacterial contamination, building disinfection, etc.), aerosols will be created to some extent with the addition of heated, moving air. Use of air filtration is the most effective means of controlling and eliminating aerosols during thermal remediation projects.

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DECLARATION OF DR. MICHAEL LINFORD UNDER 37 C.F.R. § 1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

1. I, the undersigned, am the founder of TPE Associates, a company that licenses and trains pest extermination companies in the process of Thermal Pest Eradication (TPE) as described in United States Patent No. 6,327,812 and in the present application. I am personally familiar with the practice of TPE, which includes a new process of filtering air during heat treatment to remove fine particulate matter.

2. This declaration is submitted to rebut the Examiner's rejection of Claims 18-23, 26-30, 36, and 40-43 under 35 U.S.C. § 103(a) in view of Forbes and Montellano in the Office Action mailed September 21, 2004, by showing that it would not have been obvious to combine a process for removing and capturing flying insects from a structure, as disclosed by Montellano, with a process for heating a structure to kill boring or crawling insects, as disclosed by Forbes; and that even if these references were combined, the present invention does not result.

3. I have been actively involved in the business of pest control for over forty years. Recognizing the benefits of non-chemical pest control methods, I worked with Dr. Charles Forbes and Dr. Walter Ebeling to develop and commercialize their idea of using elevated temperatures and forced convection for eradication of insects (the "Forbes Method"), as described in Forbes.

4. My company is currently licensed to use Patent No. 6,327,812. Upon information and belief, should the present application issue as a patent, my company may also be interested in obtaining a license or other rights to it. Whether or not the present application issues as a patent, however, will not have a material effect on my personal financial position or that of my company, TPE Associates. I have not received, and will not receive, any compensation for preparing this declaration.

5. I am familiar with the Forbes Method and how it differs from the TPE method described in the present application. At least one important difference concerns filtering of heated air from inside of the structure. Such filtering is not disclosed in Forbes, and was not practiced until after first introduction of the present invention.

6. The Forbes Method has been in commercial use since 1989. Independent studies of its efficacy have been performed by the University of California at Berkeley, the University of California at Riverside, the University of Hawaii, the University of California at Los Angeles, and the University of Florida. I am familiar with scientific literature regarding these studies.

7. In addition, I have communicated with numerous pest control professionals concerning use of Forbes Method since its introduction. Many of these professionals have been interested in ways to improve upon the Forbes Method as originally introduced in 1989. Since that time, various improvements have been discussed by those in the industry, some of which have been implemented.

8. In all my experience with the Forbes Method, and despite active industry interest in improving upon it, nobody ever suggested that the heated circulating air as used in the Forbes method be filtered for any purpose, prior to the present invention. Although many skilled professionals were aware of the Forbes method since 1989, none recognized the benefits of filtering the treatment air as disclosed by the present application. None recognized that the forced circulation of heated air in the Forbes Method causes a large amount of allergenic or otherwise harmful particulate matter to become airborne, and that such particulates may be removed from the environment using a filtering process as taught by the invention.

9. Typically, much of particulate matter generated during heat treatment is microscopic in size and invisible. Prior to the present invention industry professionals did not recognize generation of particulate matter as a serious issue, if at all. Many continue to perform the Forbes method without using any filtration to remove particulate matter from the interior of structures being treated. The benefits of filtration can be very significant, but they are not obvious.

10. Upon information and belief, Hedman was the first to identify complex phenomena causing particle generation during thermal eradication. These phenomena include agitation of existing dust layers, drying and dislodging of mold spores from surfaces in the structure, and the drying and dislodging of dust mites and mite feces. Such factors were not obvious, and those in the industry in fact failed to recognize these or other factors in the indoor environment that contribute to particle generation during thermal treatment, for a period of about ten years prior to the invention.

11. I have reviewed the Montellano reference cited by the Examiner. Montellano discloses an antiquated, low-volume vacuum system for suctioning flying insects out of a building. Upon information and belief, at the time the present invention was made, any person in the industry concerned with improving upon the Forbes Method, from technicians to Ph.D. etymologists, would have regarded Montellano as a mere curiosity, unrelated to the field of insect eradication by heating. Montellano would not have inspired anyone to modify the Forbes Method so as to include particulate filtering, for this reason alone. It would have simply been considered irrelevant.

12. In addition, Montellano discloses nothing about filtering allergenic particulate matter, and is instead concerned only with the filtering of large insects expelled by the vacuum system. Therefore, Montellano could have alerted no one to the problems solved by filtering air in a thermal eradication process, at the time the present invention was made. Even if it would have been considered relevant, filtering as disclosed by Montellano would not have provided any of the benefits of the invention, because a gross insect filter as disclosed by Montellano would be utterly ineffective in removing the much smaller allergens that are produced during forced-convection thermal eradication.

13. The filtered-air eradication method of the present invention provides surprising benefits that were previously not recognized as achievable by air filtering, even by the most skilled professionals in the field. One such benefit is a substantial improvement in indoor air quality after the treatment, which may be especially beneficial to patients with respiratory problems, such as asthma. Such benefits are now recognized by many. For example, at least one medical doctor has written prescriptions for the method of the invention, as marketed under the trade name "Thermapure," to his asthma patents. An exemplary Thermapure prescription written by Dr. Chris Landon, MD, of the Pediatric Diagnostic Center in Ventura, California is attached hereto as Exhibit A. In contrast, the Forbes Method, which lacks air filtration, is not recognized as providing any corresponding benefit.

14. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dr. Michael R. Linford

Date 2/21/05

FROM :DRGOLDIE

4/27

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FAX NO. :6414488 Apr. 26 2004 05:08PM P1

Chris Landon, MD
Lic #G38058

Paul Russell, MD
Lic #G58169

Todd Flosi, MD
Lic #A72889

Pediatric Diagnostic Center
3160 Loma Vista Road
Ventura, CA 93003
Tel 805-641-4490
Fax 805-641-4494
A satellite clinic of Ventura County Medical Center

Michelle Lab
Lic #A06043

Sonya Garcia
Lic #BG7950

Kevin White,
Lic #A74767

Name: Bunja, Ethan Date: 4/26/01

home phone - 805-988-2186 Thermapure
Rx cell: 805-236-4360 3y. a male. Mold allergic

Please evaluate and remediate mold.

Hospitalized for asthma

☐ Label in Spanish
☐ No Generic
Refill ____times

Signature:

FROM :DRGOLDIE

4/27

FAXED

FAX NO. :6414488 Apr. 26 2004 05:08PM P1

Chris Landon, MD
Lic #G38058

Paul Russell, MD
Lic #G58169

Todd Flosi, MD
Lic #A72889

Pediatric Diagnostic Center
3160 Loma Vista Road
Ventura, CA 93003
Tel 805-641-4490
Fax 805-641-4494
A satellite clinic of Ventura County Medical Center

Michelle Lab
Lic #A06043

Sonya Garcia
Lic #BG7950

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